U.S. Patent Application No. 10/042,549
Amendment filed with RCE dated November 17, 2004
Submission constitutes a complete response to the Office Action of November 17, 2003

REMARKS/ARGUMENTS

This Amendment is a Submission accompanying a Request for Continued Examination as defined in 37 CFR 1.114 and is in response to the Office Action dated November 17, 2003 in the above-identified application. In the Office Action of November 17, 2003, claims 1 - 94 were rejected. In response, claims 1 and 36 are canceled and claims 2 and 37 are amended. Reconsideration and continued examination of the above-identified application are respectfully requested.

The amendment to the claims is editorial in nature and/or better defines what applicants regard as the invention. Full support for the amendment can be found in the present application, including, for example, the first paragraph at page 10. The amendment to the specification returns the paragraph on page 16, ending on line 18 to its original form, thereby canceling the previous amendment to the paragraph. Accordingly, no questions of new matter should arise and entry of this amendment is respectfully requested.

Objection to the Specification

At page 2 of the Office Action, the Examiner objected to the Amendment filed on August 28, 2003 under 35 U.S.C. §132 on the alleged grounds that the amendment to the last line of the replaced paragraph on page 16, ending on line 18 contains new matter. In response, the specification is amended to return to its original form. It is noted that original claim 54 clearly discloses the temperature range in °F and the applicants are satisfied that the disclosure exists. Accordingly, this objection should be withdrawn.

Rejection of Claims 1 - 14, 16 - 17, 71 - 73, and 89 - 90 under 35 U.S.C. §103(a) over Clark et al. and WO 87/07650 (WO '650)

Claims 1 - 14, 16 - 17, 71 - 73, and 89 - 90 were rejected under 35 U.S.C. §103(a) as being obvious over Clark et al., "Influence of Transverse Rolling on the Microstructural and Textural Development of Pure Tantalum," in view of WO 87/07650 (WO '650). The Examiner alleges that Clark et al. teaches an extruded tantalum billet having a substantially uniform grain size. The Examiner acknowledges that Clark et al. does not explicitly teach the claimed purity, the metal in the article, the sputtering target or resistive film layer. The Examiner alleges that WO '650 teaches the purity claimed in claims 1 - 2, 7, and 12 and the metal in a sputtering target and a resistive film layer. The Examiner further alleges that WO '650 teaches that the use of highly pure tantalum in the formation of the target results in a high-quality oxide insulating film and metallic tantalum electrode film. The Examiner takes the position that it would have been obvious to use the high purity tantalum material of WO '650 in the process of Clark et al. in order to provide Clark et al. with the desirable result of providing a material that, when formed into a tantalum sputtering target as taught in WO '650, yields a high quality oxide insulating film and metallic tantalum electrode film. For the following reasons, this rejection is respectfully traversed.

In the present invention, as described on page 10, lines 6 - 9 of the specification, a substantially uniform grain size of a billet is achieved through the extrusion processing by itself and before any subsequent thermomechanical processing. Accordingly, claims 2 and 37 are amended herein to provide that the extruded tantalum or niobium billet has the property of having a substantially uniform average grain size after extrusion and before any further thermomechanical processing. The amendment overcomes the Examiner's allegation on pages 11

and 12 of the Office Action that the claims do not specify a billet having the required substantially uniform grain size after extrusion and before any subsequent processing.

Clark et al., on the other hand, only provides grain information for an extruded tantalum part after it has been cold rolled and annealed. The subsequent steps set forth in Clark et al., including the cold rolling and annealing, would greatly affect the properties of the rolling bar and in fact, the publication is specifically directed to determining the effect of the process of various types of rolling on microstructure and texture. There is no information provided in Clark et al. with respect to grain size or other properties of a tantalum billet after it has been extruded and before any subsequent processing. Accordingly, Clark et al. does not teach or suggest an extruded tantalum billet that has the property of having a substantially uniform average grain size after extrusion and before any further processing, as required by amended independent claim 2.

WO '650 (abstract) is applied by the Examiner as allegedly teaching a purity of tantalum metal and the use of the tantalum metal in a sputtering target and a resistive film layer. WO '650 contains no teaching or suggestion with respect to grain size uniformity. Accordingly, the combination of Clark et al. and WO '650 does not teach or suggest an extruded tantalum billet that has the property of having a substantially uniform average grain size after extrusion and before any further thermomechanical processing, as required by amended independent claim 2. Also, for the Examiner to simply assert that this material can easily be extruded and obtain the various properties set forth in the claimed invention is an argument based strictly on hindsight. As the Examiner may know, various purities of tantalum can greatly affect the outcome with respect to grain size and the uniformity of that grain size. The substitution proposed by the Examiner would not be as easy as proposed by the Examiner. As stated, the WO '650 relates to very high purity tantalum where Clark relates to certain ingots which do not state any purity levels. Withdrawal of

the rejection of claims 2 - 14, 16 - 17, 71 - 73, and 89 - 90 (claim 1 having been canceled) is therefore respectfully requested.

Rejection of Claims 18 - 35, 74 - 79, and 91 under 35 U.S.C. §103(a) over Clark et al. and WO 87/07650 (WO '650) in further view of Friedman

Claims 18 - 35, 74 - 79, and 91 were rejected under 35 U.S.C. §103(a) as being obvious over Clark et al. and WO '650 in further view of Friedman et al. (U.S. Patent No. 5,482,672). The Examiner states that Clark et al. and WO '650 are applied as discussed above, and acknowledges that these references do not explicitly teach the particular extrusion conditions. The Examiner alleges that Friedman et al. teaches the extrusion of tantalum and niobium ingots, including the temperature of extrusion, the coating of the material and the removal of the coating and that the reference teaches that extrusion is advantageous to make bars, rods and tubes out of difficult to make metals such as tantalum and niobium. The Examiner takes the position that it would have been obvious to use the particular processing conditions of Friedman et al. to provide rods, bars and tubes of tantalum or niobium. The Examiner further alleges that regarding recrystallization, Friedman et al. teaches the same process steps and that therefore, one would expect the products resulting from the process taught by the reference to be the same as the products from the claimed process. For the following reasons, this rejection is respectfully traversed.

As discussed above, the combination of Clark et al. and WO '650 does not teach or suggest an extruded ingot-derived tantalum billet that has the property of having a substantially uniform average grain size after extrusion and before any further thermomechanical processing.

Friedman et al. relates to a process for extruding a tantalum or niobium billet that has

been formed by cold isostatically pressing powdered tantalum or niobium. Although the Examiner is correct that Friedman et al. makes a passing reference to extruding solid metal, there is no teaching or suggestion in Friedman et al. that the particular processing steps and conditions that are described for extruding powdered tantalum or niobium have any relevance or application to extruding an ingot-derived metal. An ingot-derived (i.e., melted) metal is quite different from a powder metallurgy product. One cannot substitute the two products. Accordingly, since Friedman et al. teaches its particular process steps and conditions only with respect to a powdered tantalum or niobium and not with respect to a solid ingot-derived billet, the Examiner's allegation that one would expect the products resulting from the process taught by the reference to be the same as the products from the claimed process is clearly erroneous.

With respect to Friedman et al., at page 13 of the Office Action, the Examiner now appears to rely on comments made at col. 1 of Friedman et al. as opposed to the invention of Friedman et al. In particular, the Examiner relies on col. 1, lines 19-20 and lines 41-44. However, a passing reference is made to extruded billets of "solid material." There is no mention whatsoever in col. 1 that the particular processing steps referred to in Friedman et al. would equally apply to ingot derived billets. Certainly, the Examiner has not identified any particular column or line number of Friedman et al. that would provide such a teaching. Essentially, the Examiner is taking some background comments made by Friedman et al. and then without any support in Friedman et al., asserting that this background discussion can be used in the same processing steps of Friedman et al. Clearly, Friedman et al. does not teach or suggest such interchangeability and it is based strictly on the Examiner's use of hindsight, which is improper. Accordingly, it is clear that Friedman et al. does not teach or suggest specific processing steps of ingot derived tantalum billet.

The combination of Clark et al. and WO '650 does not teach or suggest an extruded ingot-derived tantalum billet that has the property of having a substantially uniform average grain size after extrusion and before any further thermomechanical processing, and Friedman et al. does not teach or suggest the use of any extruding conditions with respect to an ingot-derived tantalum billet and therefore does not teach any processing conditions that would inherently achieve a substantially uniform average grain size. Withdrawal of the rejection of claims 18 - 35, 74 - 79, and 91 is therefore respectfully requested.

Rejection of Claim 15 under 35 U.S.C. §103(a) over Clark et al. and WO 87/07650 (WO '650) in further view of Rerat

Claim 15 was rejected under 35 U.S.C. §103(a) as being obvious over Clark et al. and WO '650 in further view of Rerat (U.S. Patent No. 4,149,876). The Examiner states that Clark et al. and WO '650 are applied as discussed above, and acknowledges that these references do not explicitly teach a capacitor can. The Examiner alleges that Rerat teaches that tantalum and niobium are desirable materials for forming capacitor components, including a capacitor can. The Examiner takes the position that it would have been obvious to use the material of Clark et al. to form capacitor parts because the formation of capacitor parts from tantalum and niobium is well-known, as shown in Rerat, wherein tantalum and niobium provide desirable electrical properties to the capacitors. For the following reasons, this rejection is respectfully traversed.

As discussed above, the combination of Clark et al. and WO '650 does not teach or suggest an extruded ingot-derived tantalum billet that has the property of having a substantially uniform average grain size after extrusion and before any further thermomechanical processing. Claim 15 includes these limitations with respect to the claimed capacitor can, since claim 15

depends from independent claim 2.

Rerat relates to the production of capacitor components from powdered tantalum. Rerat does not teach or suggest an extruded ingot-derived tantalum billet that has the property of having a substantially uniform average grain size after extrusion and before any further thermomechanical processing and therefore does not teach a capacitor can comprising such an extruded tantalum billet. Accordingly, the combination of Clark et al., WO '650 and Rerat does not teach or suggest the claimed invention. Withdrawal of the rejection of claim 15 is therefore respectfully requested.

Rejection of Claims 36 - 49, 51 - 70, 80 - 88, and 92 - 94 under 35 U.S.C. §103(a) over JP '164 in view of Friedman et al. and in further view of JP '180

Claims 36 - 49, 51 - 70, 80 - 88, and 92 - 94 were rejected under 35 U.S.C. §103(a) as being obvious over JP 2000104164 A (JP '164) in view of Friedman et al. and in further view of JP 362104180 A (JP '180). The Examiner alleges that JP '164 teaches that the niobium sputtering target is made of a high grade niobium having a substantially uniform grain size of less than 100 μm and preferably 50 μm. The Examiner further alleges that JP '164 teaches a niobium sputtering target and a niobium resistive film resulting from the use of the sputtering target used in connection with a semiconductor device. The Examiner further alleges that JP '164 teaches the method of making the niobium sputtering target as including the steps of providing a purified niobium material, plastic working the material 50 - 98% and recrystallization annealing at a temperature of 800 - 1300 °C for at least one hour to produce the recrystallized niobium having a fine crystal size and that the niobium sputtering target is fully recrystallized. The Examiner acknowledges that JP '164 fails to explicitly teach extrusion. The Examiner alleges that

Friedman et al. teaches extrusion of tantalum and niobium ingots, including the temperature of extrusion, the coating of the material and the removal of the coating and that the reference teaches that extrusion is advantageous to make bars, rods and tubes out of difficult to make metals such as tantalum and niobium. The Examiner further alleges that JP '180 teaches a super high purity niobium sputtering target that has a purity of greater than 99.99% wherein the level of purity provided results in the desirable effect of reducing non-uniformity of the film resulting from the target's use in a sputtering process. The Examiner takes the position that it would have been obvious to use the process of Friedman et al. because extrusion of tantalum and niobium is known in the art as shown in Friedman et al. and that therefore, the particular processing conditions taught therein would be obvious as the particular conditions used in JP '164 wherein one of ordinary skill in the art would find it desirable to provide an extrusion process that allows for the formation of bars, rods and tubes of tantalum or niobium, as taught by Friedman et al.. Regarding purity, the Examiner alleges that one of ordinary skill in the art would have been motivated to use the high purity niobium of JP '180 in the method and composition of JP '164 to provide the desirable properties taught in JP '180, including the reduction in non-uniformity of the sputtered film. For the following reasons, this rejection is respectfully traversed.

Independent claim 37 is directed to extruded niobium billet that is ingot-derived, has a purity of at least about 99.99% and has the property of having a substantially uniform average grain size after extrusion and before any further thermomechanical processing.

JP '164, on the other hand, according to the English translation provided by the Examiner, does not teach or suggest a niobium billet. There is mention of a thermite reduction followed by EB dissolution, and there is also mention that there is plastic working by forging and rolling of the ingot. However, there appears to be no mention of a billet, which is the subject

matter of independent claim 37. Consequently, there is no teaching or suggestion of an extruded niobium billet that is ingot-derived, has a purity of at least about 99.99% and has a substantially uniform average grain size after extrusion and before any further thermomechanical processing, as required by independent claim 37.

With respect to the Examiner's argument that JP '164 necessarily suggests a billet, the applicants respectfully disagree. First, as mentioned above, the term "billet" or any description relating to a billet is not provided in JP '164. The Examiner, at page 13 of the Office Action refers to paragraph [0050] which discusses plastic working by forging and rolling to the ingot of obtained Nb. However, this discussion does not clearly suggest a billet. Rolling could very well form a metal plate or slab, and as discussed at page 2, lines 13-20 of the present application, a billet is not a metal plate or slab. Accordingly, the Examiner has not provided sufficient evidence to show that JP '164 relates to billets. Accordingly, the Examiner still has not established a *prima facie* case of obviousness.

The deficiency of JP '164 is not remedied by the secondary references, Friedman et al. and JP '180. As discussed above, Friedman et al. relates to a process for extruding a tantalum or niobium billet that has been formed by cold isostatically pressing powdered tantalum or niobium. With respect to the Examiner's argument that JP '164 necessarily suggests a billet, the applicants respectfully disagree. With respect to Friedman et al., at page 13 of the Office Action, the Examiner now appears to rely on comments made at col. 1 of Friedman et al. as opposed to the invention of Friedman et al. In particular, the Examiner relies on col. 1, lines 19-20 and lines 41-44. However, a passing reference is made to extruded billets of "solid material." There is no mention whatsoever in col. 1 that the particular processing steps referred to in Friedman et al. would equally apply to ingot derived billets. Certainly, the Examiner has not identified any

particular column or line number of Friedman et al. that would provide such a teaching. Essentially, the Examiner is taking some background comments made by Friedman et al. and then without any support in Friedman et al., asserting that this background discussion can be used in the same processing steps of Friedman et al. Clearly, Friedman et al. does not teach or suggest such interchangeability and it is based strictly on the Examiner's use of hindsight, which is improper. There is no teaching or suggestion in Friedman et al. that the particular processing steps and conditions that are described for extruding powdered tantalum or niobium have any relevance or application to extruding a solid metal. Accordingly, since Friedman et al. teaches its particular process steps and conditions only with respect to a powdered tantalum or niobium and not with respect to a solid ingot-derived billet, the combination of Friedman et al. with JP '164 clearly does not teach the claimed invention. Further, JP '180 relates to a high purity niobium film obtained by sputtering or by vapor deposition. JP '180 contains no teaching or suggestion of an extruded niobium billet that is ingot-derived, has a purity of at least about 99.99% and has the property of having a substantially uniform average grain size after extrusion and before any further thermomechanical processing, as required by independent claim 37 and does not overcome the lack of such teaching in JP '164 and Friedman et al. Withdrawal of the rejection of claims 37 - 49, 51 - 70, 80 - 88, and 92 - 94 (claim 36 having been canceled) is therefore respectfully requested.

Rejection of Claim 50 under 35 U.S.C. §103(a) over JP '164 and Friedman et al. in further view of Rerat and in further view of JP '180

Claim 50 was rejected under 35 U.S.C. §103(a) as being obvious over JP '164 and Friedman et al. in further view of Rerat and in further view of JP '180. The Examiner states that

JP '164, Friedman et al. and JP '180 are applied as discussed above, and acknowledges that these references do not explicitly teach a capacitor can. The Examiner alleges that Rerat teaches that tantalum and niobium are desirable materials for forming capacitor components, including a capacitor can. The Examiner takes the position that it would have been obvious to use the material of JP '164 to form capacitor parts because the formation of capacitor parts from tantalum and niobium is well-know, as shown in Rerat, wherein tantalum and niobium provide desirable electrical properties to the capacitors.

As discussed above, the combination of JP '164, Friedman et al. and JP '180 does not teach or suggest an extruded ingot-derived niobium billet that has the property of having a substantially uniform average grain size after extrusion and before any further processing. Claim 50 includes these limitations with respect to the claimed capacitor can, since claim 50 depends from independent claim 37.

Rerat relates to the production of capacitor components from powdered niobium. Rerat does not teach or suggest an extruded ingot-derived niobium billet that has the property of having a substantially uniform average grain size after extrusion and before any further processing. Accordingly, the combination of JP '164, Friedman et al., JP '180 and Rerat does not teach or suggest the claimed invention. Withdrawal of the rejection of claim 50 is respectfully requested.

CONCLUSION

In view of the foregoing remarks, Applicants respectfully request the reconsideration of this application and the timely allowance of the pending claims.

If there are any other fees due in connection with the filing of this response, please charge the fees to Deposit Account No. 03-0060. If a fee is required for an extension of time under 37

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C.F.R. § 1.136 not accounted for above, such extension is requested and should also be charged to said Deposit Account.

Respectfully submitted,

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